

CLAIMS

1. A method for automatic dose control of one or more chemicals in a liquid treatment system, **characterized** in that the properties of liquid are used to modify the control surface of a linguistic equation (LE) controller adaptively by means of a predefined adaptation model to control the dosing of one or more chemicals to the liquid by one or more controllers.
2. The method of claim 1, **characterized** in that said linguistic equation is a dynamic linguistic equation.
3. The method of claim 1, **characterized** in that said linguistic equation is a static linguistic equation.
4. The method of any of the claims 1–3, **characterized** in that said linguistic equation is a non-linear linguistic equation.
5. The method of any of the preceding claims, **characterized** in that at least one of said controllers is a feedback controller.
6. The method of any of the preceding claims, **characterized** in that at least one of said controllers is a feedforward controller.
7. The method of any of the preceding claims, **characterized** in that the controller setup comprises one or more cascade controllers.
8. The method of any of the preceding claims, **characterized** in that said properties of the liquid are described by quality index.
9. The method of claim 8, **characterized** in that said quality index is purity index.
10. The method of any of the preceding claims, **characterized** in that said liquid is water.
11. The method of any of the preceding claims, **characterized** in that said liquid treatment system is a water purification system.

12. The method of any of the preceding claims, **characterized** in that said chemicals are coagulants, flocculants, oxidants, reductants, adsorbents, dispersing agents, biocides or defoamers or combinations thereof.

5 13. The method of any of the preceding claims, **characterized** in that said properties of liquid are defined from incoming liquid.

14. The method of any of the preceding claims, **characterized** in that said properties of liquid are defined from outgoing liquid.

10

15. The method of any of the preceding claims, **characterized** in that said adaptation is performed by LE-model.

15 16. The method of any of the claims 1–15, **characterized** in that said adaptation is performed by fuzzy model.

17. The method of any of the preceding claims, **characterized** in that said adaptation is based on remote operation.

20 18. A device arrangement for automatic dose control of chemicals in liquid treatment system, **characterized** in that it comprises one or more adaptation models and controllers, and the properties of liquid are arranged to modify the control surface of a linguistic equation (LE) controller adaptively by means of a predefined adaptation model, to control the dosing of chemicals to the liquid by one or more
25 controllers.

19. The device arrangement of claim 18, **characterized** in that said linguistic equation is a dynamic linguistic equation.

30 20. The device arrangement of claim 18, **characterized** in that said linguistic equation is a static linguistic equation.

21. The device arrangement of any of the claims 18–20, **characterized** in that said linguistic equation is a non-linear linguistic equation.

35

22. The device arrangement of any of the claims 18–21, **characterized** in that at least one of said controllers is a feedback controller.

23. The device arrangement of any of the claims 18–22, **characterized** in that at least one of said controllers is a feedforward controller.
24. The device arrangement of any of the claims 18–23, **characterized** in that the controller setup comprises one of more cascade controllers.
25. The device arrangement of any of the claims 18–24, **characterized** in that said properties of the liquid are described by quality index.
26. The device arrangement of claim 25, **characterized** in that said quality index is purity index.
27. The device arrangement of any of the claims 18–26, **characterized** in that said liquid is water.
28. The device arrangement of any of the claims 18–27, **characterized** in that said liquid treatment system is a water purification system.
29. The device arrangement of any of the claims 18–28, **characterized** in that said chemicals are coagulants, flocculants, oxidants, reductants, adsorbents, dispersing agents, biocides or defoamers or combinations thereof.
30. The device arrangement of any of the claims 18–29, **characterized** in that said properties of liquid are defined from incoming liquid.
31. The device arrangement of any of the claims 18–30, **characterized** in that said properties of liquid are defined from outgoing liquid.
32. The device arrangement of any of the claims 18–31, **characterized** in that said adaptation is arranged to be performed by LE-model.
33. The device arrangement of any of the claims 18–31, **characterized** in that said adaptation is arranged to be performed by fuzzy model.
34. The device arrangement of any of the claims 18–33, **characterized** in that said adaptation is based on remote operation.

35. The device arrangement of any of the claims 18–34, **characterized** in that it further comprises an intelligent analyzer.